with which he makes recondite matters plain and the living atmosphere with which he surrounds his subject can scarcely fail to excite a response in everyone who is not utterly dead to intellectual stimulus.

The volume is essentially one to possess, for every page can be read with interest, whilst its graceful style will surely commend it to a wide circle of friends. J. B. F.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Stimulation of Plant-growth by Electric Fields.

THE experiments on the electric stimulation of vegetable growth, initiated in this country by Sir Oliver Lodge and others, are generally held to have given a substantial result. But there does not seem to be any definite view among botanists and experimenters as to the way in which it is brought about.

It appears that present practice is to fix a horizontal network of wires ten yards apart at a height of five yards above the ground, and to maintain it at an electric potential of 120,000 volts. This gives a vertical field of about 200 volts per centimetre, which is not far from a hundred times the order of magnitude of the natural atmospheric gradient. The procedure suggests that it is the field of force that is expected to produce the stimulation. The comparatively trifling amount of electricity that leaks from the wires into the atmosphere could scarcely produce directly any sensible effect.

It has, of course, been surmised for a long time that one function of spicules and edges and hairs on vegetation may be to promote discharge into the atmospheric electric field. Although electrostatic discharge is a surface phenomenon, the growing points may thus be stimulated by the electric field, there very highly concentrated. A positive gradient might conceivably have a different effect from a negative one. The discharge would go on at the enhanced rate due to the increased field, even if the wire grating were protected entirely from leakage. In that case no motive power would be required to maintain its potential, notwithstanding the current that is produced. No paradox is thereby involved. If the atmosphere were absolutely still, the current would pass from the earth to the wires, and leakage would be an essential part of it. But actually the electric discharge from the spicules of the vegetation is mainly borne away on the breeze, and whatever power is needed to sustain the action is contributed from the energy of the wind. It would appear that effective observations might go on even in the limited space of an ordinary greenhouse, using a grating attached to a static source of potential. J. L.

Cambridge, February 14.

Photographic Determination of the Altitude of the Aurora of December 16, 1917, in Christiania.

IT may be of interest to readers of NATURE to know that I succeeded in obtaining a series of simultaneous photographs of the aurora of December 16 last from two stations—Christiania and Aas, twenty-eight kilometres from each other.

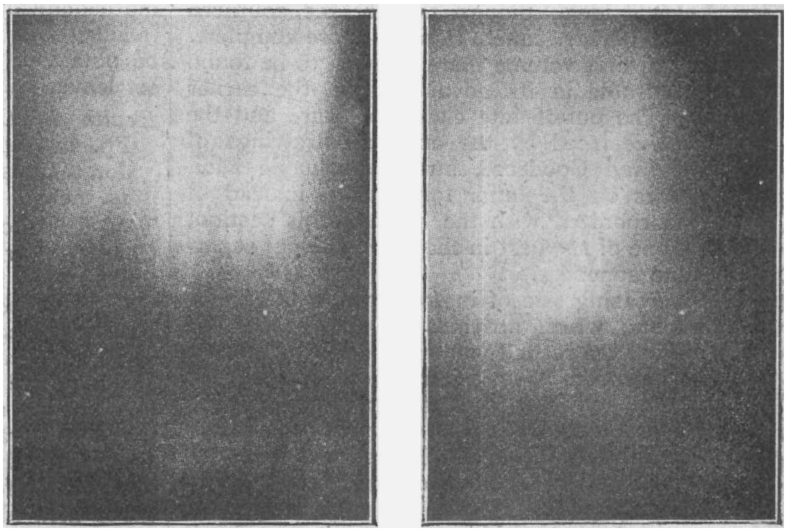

FIG. 1.—Aurora rays, December 16, 1917, 21h. 9m. G.M.T., photographed simultaneously from Christiania (left) and Aas (right). The rays reached down to a height of 100 kilometres above the earth. Stars of the Great Bear constellation are seen in the photograph.

The measures give altitudes of the *same* order as those obtained in Bossekop in 1913—that is, about 100 km. for the lower border of rays and curtains. This agrees with other measurements of the aurora

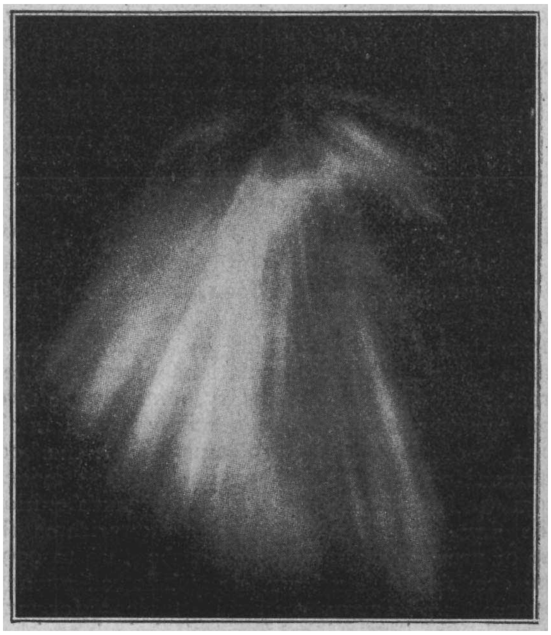

FIG. 2.—Corona, December 16, 1917, 21h. 10m. G.M.T. in Christiania. Exposure two seconds. Stars of the constellation Auriga are seen to the right.

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of February 15, 1917, with the same base, Christiania-Aas.

It seems, then, that the cosmic rays causing the aurora have the same penetrability as those causing the aurora *in the aurora zone,* and that the southern situation is due to systems of corpuscular currents outside the earth, currents which are also the principal cause of the accompanying magnetic storms (see my Memoir in the *Archives des sciences physiques et naturelles,* Geneva, 1911–12).

The photographs were taken with plates only sensitive to blue and violet rays. As red rays occurred during the aurora, no measurements of these interesting phenomena were obtained. I have written to England for red sensitive plates, and if I succeed in securing them further important results may be obtained.

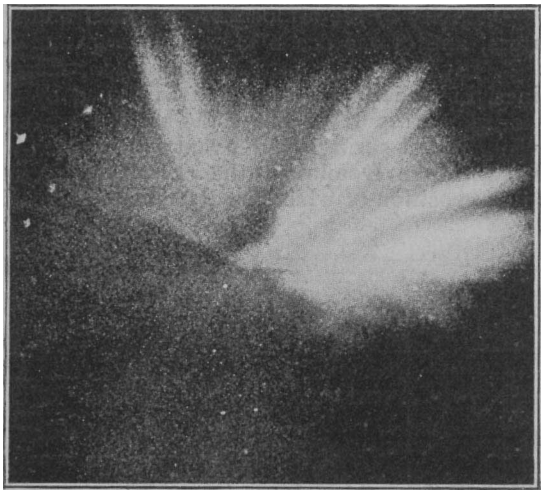

FIG. 3.—Corona, December 16, 1917, 21h. 11m. G.M.T. in Christiania. Stars of the constellation Perseus are seen near the centre, and Capella appears near the left border, though its image is deformed owing to the short focus lens used.

The illustrations represent a pair of photographic views of aurora rays; and photographs of the corona, showing that the rays are curved a little in their upper parts, which extend to about 400 km. above the earth.

CARL STÖRMER.

University of Christiania, January 28.

Eastern and Western Asymmetry of Solar Prominences.

REGARDING the suggested physical origin of a seeming predominance of solar prominences seen on the east limb as compared with the west limb, referred to in NATURE of January 31, p. 425, allow me to direct attention to numerous observations I have made which leave no doubt as to a predominance of deflection effects on and near the east limb being mostly to the violet, whereas west of the central meridian and on the west limb they are mostly towards the red. This feature is confirmed by the observations of M. Deslandres, and an illustrated account is given by him in the Paris *Comptes rendus,* tome 155, p. 1573 (séance du 30 décembre, 1912).

The deflection effects recently reported in the *Astrophysical Journal* by Mr. F. Ellerman are, in my opinion, the spectroscopic disc representation of the brilliant, and in most cases radially set, sharp "spikes" which an active area invariably exhibits when passing the limbs. I have seen the short-lived brilliant effects on the disc very often and their quick subsidence into dusky and dark forms, the brilliant initial outburst and its dusky sequence being distinctly punctuated by a very brief interval of partial or entire invisibility, owing to the luminosity passing the stage of that of the general disc itself. The life of the "spikes," when seen on the limb, is of the same brevity, and the identity of the two phenomena has long since been recognised by me from these observations and their interpretation.

ALBERT ALFRED BUSS.

22 Egerton Road, Chorlton-cum-Hardy,
Manchester, February 26.

A GRAHAM BELL TELEPHONE MEMORIAL.

THE Duke of Devonshire, Governor-General of Canada, on behalf of the Bell Memorial Committee, presented on October 24, 1917, to the town of Brantford, Ontario, a public park which will be known as the Alexander Graham Bell Gardens, the house in which the invention of the telephone was made, and a memorial monument to the inventor himself. For the accompanying photograph of the memorial we are indebted to the courtesy of Mr. G. H. Grosvenor, editor of the *National Geographic Magazine* of Washington. It is by the sculptor, W. S. Allward, and is allegorical. The figure on each side, one representing the speaker and the other the listener, is in bronze, and mounted on a granite pedestal. The panel on the crest of the memorial represents "Humanity in communication," the three shadowy figures being Knowledge, Joy, and Sorrow. They are bound together by lines representing telephone wires, the curved outline of the upper part of the monument representing the curvature of the earth. On the right and left are two circular panels inscribed as follows: "Opus Telephonica Patri Dedicatum Est." and "Mundus Telephonica Usu Recreatus Est." Underneath the central panel are the words: "To commemorate the invention of the telephone by Alexander Graham Bell in Brantford in 1874."

We congratulate the Canadians on having acquired such an interesting memorial of the great inventor. Dr. Bell's invention laid the foundation of a great and flourishing industry, which employs many hundreds of thousands of men and women, and in which many hundreds of millions of pounds are invested. He is one whom every man of science and engineer delights to honour.

It is interesting to remember that Dr. Bell's father, Mr. Alexander Melville Bell, the inventor of a well-known "visible speech" system, was for many years a lecturer on elocution in Edinburgh. His mother was a daughter of Surgeon Symonds, R.N. He himself was born in 1847, and educated at the Royal High School, Edinburgh. When fourteen years old he came to London, and was instructed by his grandfather, Alexander Bell, in elocution and the mechanism of speech. He was a teacher at Weston House Academy, Elgin, for a year, and then entered Edinburgh University, where he studied Latin under Sellar and Greek under Blackie. After being a schoolmaster again at Elgin

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